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RESEARCHES UPON COMET V, 1889, BY DR. CHARLES LANE POOR.

NOTE: In the JOHNS HOPKINS University circular for May, 1894, Dr. POOR has an extremely interesting abstract of his researches upon the orbit of BROOKS' comet (1889, V) discovered on July 6, 1889. An abstract, by Professor CAMPBELL, of some of Dr. POOR'S work has already been printed in these *Publications* (Vol. V, 1893, page 232), to which the reader is referred. What follows is quoted directly from Dr. POOR'S paper, with a few omisions: E. S. H.

"AS TO IDENTITY OF BROOKS' COMET WITH COMET LEXELL, 1770.

"LEXELL'S comet underwent its notable disturbance in the year 1779, and, moreover, this disturbance took place in that part of *Jupiter's* orbit in which Comet V, 1889, suffered its great change of elements, as above discussed, in the year 1886. Between these two appulses there intervened a period of 107 years, which period must be accurately accounted for in order to establish the identity of these two remarkable bodies. But, assuming the substantial correctness of the present investigation, we cannot directly account for these necessary years. For the period of Comet V in 1884, or previous to its disturbance, has been shown to be 31.38 ± 1.50 years, which is not an aliquot part of 107. Hence; unless in the intervening years the comet suffered other and marked disturbances in its orbit, the entire question as to the identity between the two bodies falls at once. A further investigation shows us that such disturbances did take place during this interval, but leaves us utterly in the dark as to the resulting changes in the orbit. The uncertainty in the original observations become so magnified in this part of the comet's orbit that we can no longer trace its path with absolute accuracy, we cannot say with certainty that the two comets are or are not identical. The probability now seems to be that they are not one and the same body. For a definite solution of the problem we must await the reappearance of the comet in 1896. The first few observations in that year will furnish * * * a final answer to the question of identity.

"These changes in the orbit of the comet will be better understood by referring to Figure 1. The three concentric circles represent respectively the orbits of the Earth, *Jupiter* and *Saturn;* the small ellipse, part full, part dotted, the present orbit of the comet, while the two large ellipses, with the shaded space between them, the possible orbits of the comet before the great disturbance by *Jupiter*, in 1886. All these various paths for the comet are tangent to one another at the point of closest approach to the orbit of *Jupiter*, namely, *P*. This figure shows at a glance the great change that took place in the motion of the body.

"The heavily drawn portion of the small ellipse represents that part of the comet's path which it was actually seen to describe during the years 1889 and 1890. The remainder of this curve and the large ellipses were determined by tracing the comet backward step by step: such curves are entirely theoretical. The still outstanding uncertainty in the present orbit of the comet is so slight that it cannot be represented in the diagram. But unfortunately we cannot speak so definitely in regard to the orbit before 1884; the uncertainty is here much magnified and is clearly shown in the diagram.

"All that we can definitely say at present is that previous to 1884 the comet was traveling about the Sun, in an ellipse of about 31 years' period; that its path lay somewhere within the shaded portion of the figure; that during nearly a century this path was undisturbed. In whatever one of these various paths the comet was traveling it reached the point of tangency in the summer of 1886; at this same time *Jupiter* arrived at the corresponding part of its orbit, and the comet was gradually drawn from the large to the smaller ellipse. In this smaller ellipse it will continue to travel for a number of years, returning to perihelion in the first part of November, 1896. It should be first seen by the aid of the LICK telescope in May, 1895, and with medium sized instruments in the spring of 1896."

THE PASSAGE OF COMET V, 1889, THROUGH JUPITER'S SATELLITE SYSTEM, BY DR. CHARLES LANE POOR.

[Abstract of papers in *Astronomical Journal*, Nos. 302 and 309.]

"In 1886, *as above stated*, the comet passed very close to the planet *Jupiter;* probably within the orbit of the fifth satellite. Exactly how close the two bodies were at any given time is impossible to say; the uncertainty introduced through the original